



U.S. PTO Customer No. 25280

Case No. 2029

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of: Brian G. Morin et al.
Serial Number: 09/178,396
Filed: October 23, 1998
For: **Textile Fabric With Particle Attracting Finish**

Group Art Unit: 1771
Examiner: Pratt, Christopher C.

**TRANSMITTAL OF APPEAL BRIEF AND AUTHORIZATION TO CHARGE
DEPOSIT ACCOUNT**

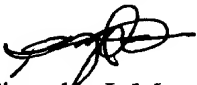
Commissioner of Patents
PO Box 1450
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Sir:

Applicant hereby transmits its Appeal Brief, in triplicate. Please charge the fee pursuant to 37 C.F.R. §1.17(c) of \$330.00 to Deposit Account No. 04-0500 as well as any additional fee required. A duplicate copy of this Authorization is provided.

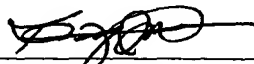
Respectfully requested,

October 3, 2003


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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Commissioner of Patents, P. O. Box 1450, Alexandria, VA 2313-1450, on October 3, 2003, along with a Request for Extension of Time, Brief of Appeal Under 37 CFR§1.192 and a postcard receipt.


Timothy J. Monahan
Attorney for Applicant(s)

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Mail Stop Appeal Brief - Patents
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BRIEF ON APPEAL UNDER 37 CFR § 1.192

This is an appeal in the application for patent filed October 23, 1998, Serial No. 09/178,396.

REAL PARTY IN INTEREST

The real party in interest is Milliken & Company by virtue of (1) an assignment from the inventors (Morin, McBride and Chambers) to Milliken Research Corporation recorded at Reel/ Frame: 9672/0698; and (2) an assignment from Milliken Research Corporation to Milliken & Company, recorded at Reel/ Frame: 010277/0198. The undersigned attorney represents that the assignment and recordation documents have been reviewed, and that upon information and belief, title to the invention is with Milliken & Company

RELATED APPEALS AND INTERFERENCES

None.

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STATUS OF THE CLAIMS

The appealed claims are Claims 1-31, which have been finally rejected, and are the only claims pending in the application. A copy of the pending claims is attached hereto and is identified as Appendix 1.

STATUS OF THE AMENDMENTS

No amendments to the Claims have been submitted, after final rejection, and there are no unentered amendments in the application.

SUMMARY OF THE INVENTION

The present invention relates to wipers for use in cleanrooms. The wipers are used to remove contaminants, especially particulate contaminants, from working surfaces and equipment in cleanrooms. In many fields, such as semiconductor manufacture, particle contamination remains a serious threat to product yield. In addition to being able to adsorb particulate contaminants, it is critical that the wipers not be a source of contamination themselves. Cleanroom wipers must meet stringent performance standards with regard to particulate release, extractable matter and sorbency. Thus, the problem to be solved is to remove particulate contamination from the cleanroom, while minimizing the introduction of particulate contamination from the wiper.

The solution provided by the present invention is a textile wiper having a particle attracting polymer coating. The polymer coating provides two functions. First, the polymer coated wiper shows increased adsorption of particulate contaminants in the 1 to 5 μm range of at least 50%, typically 100% or greater, relative to an uncoated wiper. (Spec. page 5, lines 7-8 and page 8, lines 3-9.) Second, it is believed that the polymer coating acts as a barrier to particulates released from the textile fibers used to construct the wiper, such as oligimers, which can migrate to the surface of synthetic fibers. (Spec. page 19, lines 10-14.)

The claimed invention is limited to wipers meeting the stringent particle release requirements of cleanrooms. (Spec. page 13, line 3 – page 14, line 17 and page 18, line 16 – page 19, line 9). For example, a maximum particle release count for particles greater than 0.5 μm or particles greater than 5 μm is included within the claims. The maximum particle release limitation distinguishes the invention from dust cloths, shop towels, etc., which are used in applications where particulate adsorption and release in the 0.5 μm to 20 μm range is not

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important. (Spec. page 8, lines 1-2.)

The particle attracting polymer coating may be selected from polymers having pendent groups, which exhibit hydrogen bonding or have acid-base reactive groups. A more detailed description of the polymers may be found in the Specification at page 4, lines 7-15 and page 8, line 10 to page 10, line 2.

The wipers may be selected from a variety of textiles, preferably woven or knitted synthetic textiles, ranging in weight from 1 to 16 ounces per square yard. A detailed description of the fabrics, construction, fibers and weights may be found in the Specification at page 5, line 11 to page 6, line 9.

ISSUES

The issues presented for appeal relate to 35 USC §103, in particular:

- (a) Has the examiner correctly applied the standard of obviousness under 35 USC § 103, in maintaining the claims unpatentable over Yahiaoui et al. (US 5,814,567), in view of Zeidell (US 3,902,299)? In particular, is the test for combining references “what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art”?
- (b) Has the examiner failed to give due weight to Applicants evidence of a long felt need for a cleanroom wiper having a low particulate release count and a high particulate adsorption?
- (c) Do the unexpected advantages of the claimed cleanroom wiper, i.e. 50% or greater increase in fine particulate adsorption / very low particulate release, rebut a *prima facie* case of obviousness?

GROUPING OF THE CLAIMS

The examiner has grouped Claims 1-5, 7-11 and 13-30 together for consideration.

Applicants submit that Claims 1-5, 7-11, 16-17, 19-20 and 24-30 are separately patentable. The latter claims include the limitation that the particle attraction coefficient (the weight of 3 μ m size particles adsorbed relative to the identical, uncoated wiper) is 50% or greater. A 50% improvement in adsorption of particulate contaminants is a significant and unexpected advantage relative to the prior art, and rebuts a finding of obviousness.

Applicants submit that Claims 4, 13, 16, 17, and 25 are separately patentable. The claims include the limitation that the particle attraction coefficient is 100% or greater. If a 50% improvement in performance is not a significant and unexpected advantage relative to the prior

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art, a 100% or greater improvement is clearly a significant and unexpected advantage.

The examiner has grouped Claims 21-33 [sic] together for consideration. For the reasons stated above, Applicants submit that Claims 24-30 are separately patentable.

ARGUMENTS

Examiner's Rationale

Claims 1-5, 7-11 and 13-30 were rejected under 35 USC § 103(a) as being unpatentable over Yahiaoui et al., US 5,814,567, in view of Zeidell, US 3,902,299, as set forth previously.

Yahiaoui et al. teach that the coated fabric may be used as a wipe. Zeidell teaches laundering wipes to remove unwanted lint and debris. The skilled artisan would have been motivated to launder the fabric of Yahiaoui et al. by the desire to remove lint and debris from the wipe. Further, the Examiner finds that the skilled artisan would have been motivated to launder the fabric sufficiently to achieve Applicants' particle release property by the desire to further reduce lint and debris, thereby allowing the wipe to be sold into markets where improved particle release properties are desired.

In support of the rejection, the examiner quoted *In re McLaughlin*, 170 USPQ 209, 212 (CCPA 1971), which states that "the test for combining references is what the combination of disclosures taken as a whole suggest to one of ordinary skill in the art."

With regard to Applicants secondary evidence of non-obviousness (long felt need in the art), the examiner found that the Applicants failed to meet the burden of showing how the evidence related to the present invention and how the present invention solved the long felt need.

With regard to the unexpected advantages of the present invention (significant increase in adsorption of fine particles), the examiner found that a material would not be suitable as a "wipe" if it did not attract particles to facilitate removing them from a surface. Therefore, it is the examiner's position that Yahiaoui et al.'s fabric has the same ability to attract particles.

Rebuttal

The examiner's reliance on *In re McLaughlin* suggests that patentability is being evaluated based on "what the combination of disclosures" suggests to one of ordinary skill in the art. The Applicants respectfully submit that the standard relied upon by the examiner is contrary to *Graham v. John Deere*, 383 US 1 (1966) and the USPTO guidelines. For example, MPEP § 2142 states that "the examiner must step back in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made."

In order to establish a *prima facie* case of obviousness, there must be some suggestion or motivation to combine reference teachings. In other words, the individual references are first considered separately, and the motivation to combine or modify the references must be found in the references themselves, or the general knowledge of the skilled person. MPEP § 2142. If patentability is evaluated based on what the combination of references suggests to the skilled person, however, then the references have first been combined as taught by the Applicants, based upon impermissible hindsight reconstruction, and the requirement that there be a suggestion or motivation to combine the references is circumvented.

For the following reasons, Applicants submit that a *prima facie* case of obviousness under 35 USC § 103 has not been established.

Scope and content of the prior art

Yahiaoui et al. is directed to disposable absorbent products, such as diapers, training pants, feminine care products, incontinent care products, surgical gowns, surgical drapes, wipes and the like. The object of Yahiaoui et al. is to treat a hydrophobic substrate with a durable coating, which is wettable by water without significantly lowering the surface tension of an aqueous medium to which the coated substrate may be exposed. ('567 at col. 1, lines 44-48).

The term "wipes" is quite general. In the context of the disclosure of Yahiaoui et al., the term would be understood by the skilled person to include low-cost, melt-blown polypropylene sheets used in pre-saturated, disposable towlettes. There is no suggestion in Yahiaoui et al. that the coated hydrophobic substrates have utility in cleanrooms, or other environment requiring stringent particle release limitations.

While Yahiaoui et al. refer to the coatings as being "durable", the term is used in a relative sense, i.e. the substrate remains wettable after at least three exposures to an aqueous medium, and that the coating does not significantly depress the surface tension of an aqueous medium with which the coated substrate may come in contact. ('567 col.2, lines 44-49 and col. 4, lines 27-33). The following information provided in the '567 patent demonstrate that the so-called durable coating is partially removed by simple wicking tests.

A measure of the amount of coating removed from the substrate is the depression of surface tension in the aqueous medium with which the coated substrate may come in contact. (Note Yahiaoui et al. '567 col. 1, lines 36-42, lowered surface tension in the aqueous liquid "must involve at least a partial removal of surfactant from the surface of the fibers."). Yahiaoui et al. target a surface tension depression of less than about 10 percent in the aqueous liquid with which the coated substrate comes into contact. ('567 col. 2, lines 49-51). The working examples in Yahiaoui et al. show that the coating is partially removed by a wicking test in saline solution: Example 5 – surface tension depression of 4%; Example 6 – surface tension depression of 6%; Example 7 – surface tension depression of 4%; Example 8 – surface tension depression of 9% and Table 3.

Zeidell discloses a process for laundering a wiping cloth made out of a synthetic material. The laundering process removes lint and contaminants from the cloth. The steps of the Zeidell process comprise:

- Filtering the wash water through a 5 micron filter;
- Adding detergent to the heated, filtered wash water;
- Washing the cloths in the wash water at 175 °F for 10 minutes
- Rinsing the cloths in two 5 minute rinses, followed by two 2 minute rinses in hot water;
- Rinsing the cloths in cold water for 3 minutes;
- Rinsing the cloths in a second rinse in a cold, anti-static solution for 5 minutes;
- Rinsing the cloths in a third cold water rinse for 4 minutes and extracting the water;
- Drying the cloths in a cleanroom atmosphere; and
- Placing the cloths in a plastic container until ready for use.

Zeidell does not suggest laundering coated textiles.

Differences between the claimed invention and the prior art

Applicants claim a textile fabric coated suitable for use in cleanrooms, i.e. the particle release count for particles in the 0.5 μm to 20 μm range is extremely low. For example, the particle release count of particles greater than 0.5 μm is 75 million particles per square meters or less, according to Biaxial Shake Test IEST-RP-CP-CO004.2. The textile fabric is coated with a particle attracting polymer, which increases the adsorption of particulate contaminants in the target size range of about 3 μm , by 50% or greater, relative to an uncoated fabric.

While Yahiaoui et al. disclose polymer coatings, such as those claimed by Applicants, Applicants have demonstrated that the textile fabrics of Yahiaoui et al. do not meet the particle release counts claimed in the present invention.

There is no suggestion in Yahiaoui et al. that the coated hydrophobic substrates have utility in cleanrooms, or other such environment requiring stringent particle release limitations. Likewise, there is no suggestion to launder the coated hydrophobic substrates in a cleanroom standard laundry, and thereby meet the stringent particle release requirements for cleanroom applications.

The Examiner finds the motivation to launder the coated hydrophobic substrate of Yahiaoui et al. to meet cleanroom particle release standards, based on the desire to remove unwanted lint and debris from a wiper. But, the examiner's argument fails to demonstrate why the skilled person would select a cleanroom level laundry, specifically designed to remove particulate contaminants in the range of 0.5 μm to 20 μm , to remove unwanted lint and debris. Unwanted lint and debris could be removed more economically in an ordinary industrial laundry operation.

The examiner's argument is based on hindsight reconstruction of the invention. The patent databases can be searched by key-word for "coating" and "wipe", and, whatever product is found, an argument can be created to subject the product to cleanroom laundering treatments, in order to meet the particle release requirements of cleanroom laundries.

The Applicants submit that the examiner's argument does not accurately reflect the viewpoint of the skilled person seeking to solve the problem of removing particulate contamination from the cleanroom, while minimizing the introduction of particulate contamination from the wiper. From such a viewpoint, it is unlikely that the skilled person would have selected the coated textile substrate of Yahiaoui et al. for use as a cleanroom wiper.

A critical feature of a cleanroom wiper is that the wiper not release particulate matter. In the disclosure of Yahiaoui et al., however, it is clear that in numerous wicking tests, the surface tension of an aqueous liquid is lowered, after contacting the coated substrate. Yahiaoui et al. teach that the lower surface tension is a result of the coating being partially removed. Thus, the skilled person would avoid a coated substrate, such as disclosed by Yahiaoui et al., because of the possibility that the coating would be a source of particulate contamination in cleanrooms. Additionally, the skilled person did not recognize that a polymer coating applied to the wiper would improve particle pick-up. Furthermore, coating the wiper with a polymer may have had the undesirable consequence of making it more difficult to meet the particle release count standards of cleanrooms, because of the difficulty of removing contaminants from the wiper during the laundering process.

Based on the foregoing, it is clear that there was no motivation or suggestion to select the "wipe" of Yahiaoui et al. for use as a cleanroom wiper. Additionally, the skilled person would have a reasonable expectation of success in employing the coated substrate of Yahiaoui et al., in view of the evidence of the coating being partially removed by contact with an aqueous liquid.

Long Felt Need in the Art

Without question, there has been a long felt need for a cleanroom wiper, which not only has a very low particle release count, but improved contaminant pick-up. Applicants have submitted the following references for the Examiner's consideration and entry into the record: *Evaluating cleanroom wipers to establish performance benchmarks*, Micro, pp. 51-56 (May 1998); and *Full-Fab Surface Particle Detection Improves Yields*, Semiconductor International (June 1997).

The *Evaluating cleanroom wipers* article is a benchmark study of the performance of cleanroom wipers in the microelectronics industry. The objective was to ascertain the best performance currently achievable. The first characteristic tested is "Releasable particles" i.e. the number of particles released per square meter of wiper fabric. Micro at p. 51.

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The *Full-Fab Surface Particle Detection* article discusses the criticality of removing particulate contamination from the working surfaces and equipment used in semiconductor manufacture. The authors state that "particle contamination remains a serious threat to process yield." The primary method of removing particulate contaminants is with wipers. Please note the description of wiping techniques under the section entitled "Benefits of surface monitoring."

Applicants' claimed textile fabric satisfies the aforementioned long felt needs, by providing a cleanroom wiper having dramatically improved particulate adsorption characteristics, while meeting the stringent particle release requirements. It is axiomatic that the fewer particulate contaminants in the cleanroom, the less off-quality production due to such contamination.

Unexpected Advantages

It is well established that the unexpected advantages of an invention can rebut a *prima facie* case of obviousness. *In re Chupp*, 2 USPQ2d 1437 (CAFC 1987). A significant an unexpected advantage of the present invention is the particle attraction properties of the coating, especially in the critical particle size of about 3 μm . In particular, the present invention demonstrates an improvement in adsorption of typical particulate contaminants of 50% or greater, or even 100% or greater, relative to an uncoated cleanroom wiper.

The examiner has taken the position that Yahiaoui et al.'s fabric has the same ability to attract particles. Therefore, the advantages are not unexpected.

The particle attracting advantage of the claimed coating was unknown, however, in the prior art. "Obviousness cannot be predicated on what is not known at the time an invention is made, even if the inherency of a certain feature is later established." MPEP § 2141.02, citing *In re Rijckaert*, 28 USPQ2d 1955 (CAFC 1993).

Thus, from the viewpoint of the skilled person, there is nothing in the prior art to suggest the advantages that might be achieved by employing certain polymer coatings, relative to the adsorption of fine particulate contaminants in cleanrooms. The advantages achieved in the present invention are both unexpected and significant.

Examiner's Rationale

Claims 21-33 [sic] were rejected under 35 USC § 103(a) as being unpatentable over Yahiaoui et al. in view of Zeidell, and Applicants admitted prior art (AAPA). The examiner refers to the basis of the rejection as being "previously set forth." Applicants are not aware of the listed references being cited against Claims 21-33.

The Applicants note, however, that Claims 6, 12 and 31 were rejected under 35 USC § 103 as being unpatentable over Yahiaoui et al. in view of Applicants' Admitted Prior Art (AAPA), in

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Paper # 5, mailed April 24, 2000.

The examiner found that Yahiaoui et al. disclose all elements of Applicants' Claims 1, 11 and 24, to which Claims 6, 12 and 31 depend. Yahiaoui et al. fails to disclose the fabric is saturated with a solvent and packaged in a sealed container.

AAPA teaches providing additional solvents and packages for pre-saturated wipers. Thus, it would have been obvious to utilize such packaging based on the reasonable expectation of providing pre-saturated wipers, such as are commercially available.

Rebuttal

The examiner correctly noted that Claims 6, 12 and 31 depend on independent Claims 1, 11 and 24, respectively. Applicants maintain that Claims 1, 11 and 24 are patentable, for the reasons set forth above.

Conclusion

Applicants respectfully submit that the grounds for rejection have been overcome, and the application is in condition for allowance.

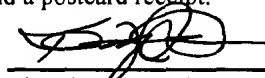
Respectfully submitted,



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Timothy J. Monahan, Attorney for Applicant(s)

Appendix 1

1. (Amended) An article comprising a textile fabric selected from the group consisting of woven, knitted, wet laid, dry laid and needle punched fabric, and a particle attracting polymer coated on the fabric, the article having a particle attraction coefficient of 50% or greater for one or more of the types of particles selected from the group consisting of carbon black, copper, copper oxide, silicon, silicon oxide, tungsten and tungsten oxide particles, and a particle release count of particles greater than 0.5 microns of 75 million particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-CC004.2.

2. (Original) The article of Claim 1 having 0.01 to 6 weight % of polymer relative to the weight of the fabric.

3. (Amended) The article of Claim 1 wherein the fabric is woven or knitted from polyester fiber and has a weight of from 2 to 9 ounces per square yard.

4. (Original) The article of Claim 1 having a particle attraction coefficient of 100% or greater for carbon black.

5. (Amended) The article of Claim 1 wherein the polymer has a number average molecular weight of 25,000 to 1,000,000 and the polymer has a plurality of pendent groups selected from the group consisting of hydroxy, hydroxyalkyl and carboxy groups.

6. (Original) The article of Claim 1 wherein the article is saturated with a solvent and packaged in a sealed container.

7. (Amended) The article of Claim 1 having a particle release count of particles greater than 0.5 microns of 30 million particles per square meter or less as measured by

Biaxial Shake Test IEST-RP-CP-CC004.2 and an extrinsic sorbency of 3.5 milliliters/meter squared or greater as measured by IEST-RP-CC004.2.

8. (Amended) An article comprising a textile fabric and a particle attracting, water-soluble polymer coated on the fabric, wherein the polymer is selected from the group consisting of:

(i) polysaccharides having a plurality of pendent groups selected from hydroxy, hydroxyalkyl and carboxy groups; and

(ii) polymers formed by vinyl polymerization, having a plurality of pendent groups selected from hydroxy, hydroxyalkyl, carboxy, amino and alkylamino groups;

wherein the article has a particle attraction coefficient of 50% or greater for carbon black, and a particle release count of particles greater than 0.5 microns of 75 million particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-CC004.2.

9. (Amended) The article of Claim 8 wherein the polymer has an average molecular weight of 50,000 to 500,000

10. (Amended) The article of Claim 9 having 0.02 to 3 weight % of polymer relative to the weight of the fabric, and the fabric has a weight of 2 to 9 ounces per square yard.

11. (Original) The article of Claim 9 wherein the polymer is selected from the group consisting of cellulose ethers, poly(vinyl alcohol) and vinyl alcohol copolymers.

12. (Original) The article of Claim 11 wherein the article is saturated with a solvent and packaged in a sealed container.

13. (Amended) The article of Claim 11 having a particle attraction coefficient of 100% or greater for carbon black and a particle release count of particles greater than 5 microns of 300,000 particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-CC004.2.

14. (Amended) A wiper comprising a woven or knitted textile fabric and a particle attracting polymer coated on the fabric, wherein the polymer is selected from the group consisting of (i) cellulose ethers; (ii) inorganic cellulose esters; (iii) chitosan; (iv) guar gums and hydroxy, hydroxyalkyl and carboxy substituted derivatives thereof; (v) starch and hydroxy, hydroxyalkyl and carboxy substituted derivatives thereof; (vi) poly(vinyl alcohol) and vinyl alcohol copolymers; (vii) poly(vinyl pyrrolidone); (viii) poly(hydroxyalkyl acrylate) and poly(hydroxyalkyl methacrylate) and (ix) poly(alkyl acrylamide) and poly(alkyl acrylamide) copolymers;

wherein the article has a particle release count of particles greater than 0.5 microns of 75 million particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-CC004.2.

15. (Original) The wiper of Claim 14 having 0.05 to 1 weight % of polymer relative to the weight of the fabric.

16. (Original) The wiper of Claim 14 having a particle attraction ratio of 100% or greater for carbon black.

17. (Amended) The wiper of Claim 16 wherein the fabric constructed from polyester yarn having a denier of 15 to 250 and the fabric has a weight of from 2 to 9 ounces per square yard.

18. (Amended) The wiper of Claim 14 the polymer is selected from the group consisting of cellulose ethers, poly(vinyl alcohol) and vinyl alcohol copolymers having a number average molecular weight of 50,000 to 500,000.

19. (Original) The wiper of Claim 18 having from 0.02 to 3 weight % of polymer relative to the weight of the fabric and a particle attraction ratio of 50% or greater for carbon black.

20. (Amended) The wiper of Claim 19 having a particle release count of particles greater than 5 microns of 30 million particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-CC004.2 and an extrinsic sorbency of 3.5 milliliters/meter squared or greater as measured by IEST-RP-CC004.2.

21. (Original) The wiper of Claim 14 wherein the article further comprises a surfactant residue in the range of 0.1 ppm to 0.5 wt.%.

22. (Original) The article of Claim 1 wherein the article further comprises a surfactant residue selected from the group consisting of anionic and nonionic surfactants, in the range of 0.5 ppm to 0.1 wt.%.

23. (Original) The article of Claim 8, wherein the article further comprises a surfactant residue in the range of 0.1 ppm to 0.5 wt.%.

24. (Amended) An article comprising a textile fabric and a particle attracting polymer coated on the fabric, the article having a particle attraction coefficient of 50% or greater for one or more of the types of particles selected from the group consisting of carbon black, copper, copper oxide, silicon, silicon oxide, tungsten and tungsten oxide particles, and a particle release count of particles greater than 5 microns of 300,000 particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-

CC004.2, and the article is packaged in a sealed container and has not been laundered subsequent to the particle attracting polymer having been coated on the fabric.

25. (Original) The article of Claim 24 having a particle attraction coefficient of 100% or greater for carbon black.

26. (Amended) The article of Claim 24 wherein the polymer has a number average molecular weight of 25,000 to 1,000,000 and the polymer has a plurality of pendent groups selected from the group consisting of hydroxy, hydroxyalkyl and carboxy groups, and the fabric has a weight of 2 to 9 ounces per square yard.

27. (Amended) The article of Claim 24 wherein the article has a particle release count of particles greater than 5 microns of 300,000 particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-CC004.2.

28. (Amended) The article of Claim 27 wherein the particle attracting polymer is water-soluble and is selected from the group consisting of:

(i) polysaccharides having a plurality of pendent groups selected from hydroxy, hydroxyalkyl and carboxy groups; and

(ii) polymers formed by vinyl polymerization, having a plurality of pendent groups selected from hydroxy, hydroxyalkyl, carboxy, amino and alkylamino groups.

29. (Amended) The article of Claim 24 wherein the article has a particle release count of particles greater than 5 microns of 150,000 particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-CC004.2.

30. (Original) The article of Claim 29 wherein the particle attracting polymer is selected from the group consisting of (i) cellulose ethers; (ii) inorganic cellulose esters; (iii) chitosan; (iv) guar gums and hydroxy, hydroxyalkyl and carboxy substituted derivatives thereof; (v) starch and hydroxy, hydroxyalkyl and carboxy substituted derivatives thereof; (vi) poly(vinyl alcohol) and vinyl alcohol copolymers; (vii) poly(vinyl pyrrolidone); (viii) poly(hydroxyalkyl acrylate) and poly(hydroxyalkyl methacrylate) and (ix) poly(alkyl acrylamide) and poly(alkyl acrylamide) copolymers.

31. (Original) The article of Claim 24 wherein the article is saturated with a solvent and packaged in a sealed container.



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RELATED APPEALS AND INTERFERENCES

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SUMMARY OF THE INVENTION

The present invention relates to wipers for use in cleanrooms. The wipers are used to remove contaminants, especially particulate contaminants, from working surfaces and equipment in cleanrooms. In many fields, such as semiconductor manufacture, particle contamination remains a serious threat to product yield. In addition to being able to adsorb particulate contaminants, it is critical that the wipers not be a source of contamination themselves. Cleanroom wipers must meet stringent performance standards with regard to particulate release, extractable matter and sorbency. Thus, the problem to be solved is to remove particulate contamination from the cleanroom, while minimizing the introduction of particulate contamination from the wiper.

The solution provided by the present invention is a textile wiper having a particle attracting polymer coating. The polymer coating provides two functions. First, the polymer coated wiper shows increased adsorption of particulate contaminants in the 1 to 5 μm range of at least 50%, typically 100% or greater, relative to an uncoated wiper. (Spec. page 5, lines 7-8 and page 8, lines 3-9.) Second, it is believed that the polymer coating acts as a barrier to particulates released from the textile fibers used to construct the wiper, such as oligimers, which can migrate to the surface of synthetic fibers. (Spec. page 19, lines 10-14.)

The claimed invention is limited to wipers meeting the stringent particle release requirements of cleanrooms. (Spec. page 13, line 3 – page 14, line 17 and page 18, line 16 – page 19, line 9). For example, a maximum particle release count for particles greater than 0.5 μm or particles greater than 5 μm is included within the claims. The maximum particle release limitation distinguishes the invention from dust cloths, shop towels, etc., which are used in applications where particulate adsorption and release in the 0.5 μm to 20 μm range is not

important. (Spec. page 8, lines 1-2.)

The particle attracting polymer coating may be selected from polymers having pendent groups, which exhibit hydrogen bonding or have acid-base reactive groups. A more detailed description of the polymers may be found in the Specification at page 4, lines 7-15 and page 8, line 10 to page 10, line 2.

The wipers may be selected from a variety of textiles, preferably woven or knitted synthetic textiles, ranging in weight from 1 to 16 ounces per square yard. A detailed description of the fabrics, construction, fibers and weights may be found in the Specification at page 5, line 11 to page 6, line 9.

ISSUES

The issues presented for appeal relate to 35 USC §103, in particular:

- (a) Has the examiner correctly applied the standard of obviousness under 35 USC § 103, in maintaining the claims unpatentable over Yahiaoui et al. (US 5,814,567), in view of Zeidell (US 3,902,299)? In particular, is the test for combining references “what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art”?
- (b) Has the examiner failed to give due weight to Applicants evidence of a long felt need for a cleanroom wiper having a low particulate release count and a high particulate adsorption?
- (c) Do the unexpected advantages of the claimed cleanroom wiper, i.e. 50% or greater increase in fine particulate adsorption / very low particulate release, rebut a *prima facie* case of obviousness?

GROUPING OF THE CLAIMS

The examiner has grouped Claims 1-5, 7-11 and 13-30 together for consideration.

Applicants submit that Claims 1-5, 7-11, 16-17, 19-20 and 24-30 are separately patentable. The latter claims include the limitation that the particle attraction coefficient (the weight of 3µm size particles adsorbed relative to the identical, uncoated wiper) is 50% or greater. A 50% improvement in adsorption of particulate contaminants is a significant and unexpected advantage relative to the prior art, and rebuts a finding of obviousness.

Applicants submit that Claims 4, 13, 16, 17, and 25 are separately patentable. The claims include the limitation that the particle attraction coefficient is 100% or greater. If a 50% improvement in performance is not a significant and unexpected advantage relative to the prior

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art, a 100% or greater improvement is clearly a significant and unexpected advantage.

The examiner has grouped Claims 21-33 [sic] together for consideration. For the reasons stated above, Applicants submit that Claims 24-30 are separately patentable.

ARGUMENTS

Examiner's Rationale

Claims 1-5, 7-11 and 13-30 were rejected under 35 USC § 103(a) as being unpatentable over Yahiaoui et al., US 5,814,567, in view of Zeidell, US 3,902,299, as set forth previously.

Yahiaoui et al. teach that the coated fabric may be used as a wipe. Zeidell teaches laundering wipes to remove unwanted lint and debris. The skilled artisan would have been motivated to launder the fabric of Yahiaoui et al. by the desire to remove lint and debris from the wipe. Further, the Examiner finds that the skilled artisan would have been motivated to launder the fabric sufficiently to achieve Applicants' particle release property by the desire to further reduce lint and debris, thereby allowing the wipe to be sold into markets where improved particle release properties are desired.

In support of the rejection, the examiner quoted *In re McLaughlin*, 170 USPQ 209, 212 (CCPA 1971), which states that "the test for combining references is what the combination of disclosures taken as a whole suggest to one of ordinary skill in the art."

With regard to Applicants secondary evidence of non-obviousness (long felt need in the art), the examiner found that the Applicants failed to meet the burden of showing how the evidence related to the present invention and how the present invention solved the long felt need.

With regard to the unexpected advantages of the present invention (significant increase in adsorption of fine particles), the examiner found that a material would not be suitable as a "wipe" if it did not attract particles to facilitate removing them from a surface. Therefore, it is the examiner's position that Yahiaoui et al.'s fabric has the same ability to attract particles.

Rebuttal

The examiner's reliance on *In re McLaughlin* suggests that patentability is being evaluated based on "what the combination of disclosures" suggests to one of ordinary skill in the art. The Applicants respectfully submit that the standard relied upon by the examiner is contrary to *Graham v. John Deere*, 383 US 1 (1966) and the USPTO guidelines. For example, MPEP § 2142 states that "the examiner must step back in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made."

In order to establish a *prima facie* case of obviousness, there must be some suggestion or motivation to combine reference teachings. In other words, the individual references are first considered separately, and the motivation to combine or modify the references must be found in the references themselves, or the general knowledge of the skilled person. MPEP § 2142. If patentability is evaluated based on what the combination of references suggests to the skilled person, however, then the references have first been combined as taught by the Applicants, based upon impermissible hindsight reconstruction, and the requirement that there be a suggestion or motivation to combine the references is circumvented.

For the following reasons, Applicants submit that a *prima facie* case of obviousness under 35 USC § 103 has not been established.

Scope and content of the prior art

Yahiaoui et al. is directed to disposable absorbent products, such as diapers, training pants, feminine care products, incontinent care products, surgical gowns, surgical drapes, wipes and the like. The object of Yahiaoui et al. is to treat a hydrophobic substrate with a durable coating, which is wettable by water without significantly lowering the surface tension of an aqueous medium to which the coated substrate may be exposed. ('567 at col. 1, lines 44-48).

The term "wipes" is quite general. In the context of the disclosure of Yahiaoui et al., the term would be understood by the skilled person to include low-cost, melt-blown polypropylene sheets used in pre-saturated, disposable towlettes. There is no suggestion in Yahiaoui et al. that the coated hydrophobic substrates have utility in cleanrooms, or other environment requiring stringent particle release limitations.

While Yahiaoui et al. refer to the coatings as being "durable", the term is used in a relative sense, i.e. the substrate remains wettable after at least three exposures to an aqueous medium, and that the coating does not significantly depress the surface tension of an aqueous medium with which the coated substrate may come in contact. ('567 col.2, lines 44-49 and col. 4, lines 27-33). The following information provided in the '567 patent demonstrate that the so-called durable coating is partially removed by simple wicking tests.

A measure of the amount of coating removed from the substrate is the depression of surface tension in the aqueous medium with which the coated substrate may come in contact. (Note Yahiaoui et al. '567 col. 1, lines 36-42, lowered surface tension in the aqueous liquid "must involve at least a partial removal of surfactant from the surface of the fibers."). Yahiaoui et al. target a surface tension depression of less than about 10 percent in the aqueous liquid with which the coated substrate comes into contact. ('567 col. 2, lines 49-51). The working examples in Yahiaoui et al. show that the coating is partially removed by a wicking test in saline solution: Example 5 – surface tension depression of 4%; Example 6 – surface tension depression of 6%; Example 7 – surface tension depression of 4%; Example 8 – surface tension depression of 9% and Table 3.

Zeidell discloses a process for laundering a wiping cloth made out of a synthetic material. The laundering process removes lint and contaminants from the cloth. The steps of the Zeidell process comprise:

- Filtering the wash water through a 5 micron filter;
- Adding detergent to the heated, filtered wash water;
- Washing the cloths in the wash water at 175 °F for 10 minutes
- Rinsing the cloths in two 5 minute rinses, followed by two 2 minute rinses in hot water;
- Rinsing the cloths in cold water for 3 minutes;
- Rinsing the cloths in a second rinse in a cold, anti-static solution for 5 minutes;
- Rinsing the cloths in a third cold water rinse for 4 minutes and extracting the water;
- Drying the cloths in a cleanroom atmosphere; and
- Placing the cloths in a plastic container until ready for use.

Zeidell does not suggest laundering coated textiles.

Differences between the claimed invention and the prior art

Applicants claim a textile fabric coated suitable for use in cleanrooms, i.e. the particle release count for particles in the 0.5 μm to 20 μm range is extremely low. For example, the particle release count of particles greater than 0.5 μm is 75 million particles per square meters or less, according to Biaxial Shake Test IEST-RP-CP-CO004.2. The textile fabric is coated with a particle attracting polymer, which increases the adsorption of particulate contaminants in the target size range of about 3 μm , by 50% or greater, relative to an uncoated fabric.

While Yahiaoui et al. disclose polymer coatings, such as those claimed by Applicants, Applicants have demonstrated that the textile fabrics of Yahiaoui et al. do not meet the particle release counts claimed in the present invention.

There is no suggestion in Yahiaoui et al. that the coated hydrophobic substrates have utility in cleanrooms, or other such environment requiring stringent particle release limitations. Likewise, there is no suggestion to launder the coated hydrophobic substrates in a cleanroom standard laundry, and thereby meet the stringent particle release requirements for cleanroom applications.

The Examiner finds the motivation to launder the coated hydrophobic substrate of Yahiaoui et al. to meet cleanroom particle release standards, based on the desire to remove unwanted lint and debris from a wiper. But, the examiner's argument fails to demonstrate why the skilled person would select a cleanroom level laundry, specifically designed to remove particulate contaminants in the range of 0.5 μm to 20 μm , to remove unwanted lint and debris. Unwanted lint and debris could be removed more economically in an ordinary industrial laundry operation.

The examiner's argument is based on hindsight reconstruction of the invention. The patent databases can be searched by key-word for "coating" and "wipe", and, whatever product is found, an argument can be created to subject the product to cleanroom laundering treatments, in order to meet the particle release requirements of cleanroom laundries.

The Applicants submit that the examiner's argument does not accurately reflect the viewpoint of the skilled person seeking to solve the problem of removing particulate contamination from the cleanroom, while minimizing the introduction of particulate contamination from the wiper. From such a viewpoint, it is unlikely that the skilled person would have selected the coated textile substrate of Yahiaoui et al. for use as a cleanroom wiper.

A critical feature of a cleanroom wiper is that the wiper not release particulate matter. In the disclosure of Yahiaoui et al., however, it is clear that in numerous wicking tests, the surface tension of an aqueous liquid is lowered, after contacting the coated substrate. Yahiaoui et al. teach that the lower surface tension is a result of the coating being partially removed. Thus, the skilled person would avoid a coated substrate, such as disclosed by Yahiaoui et al., because of the possibility that the coating would be a source of particulate contamination in cleanrooms. Additionally, the skilled person did not recognize that a polymer coating applied to the wiper would improve particle pick-up. Furthermore, coating the wiper with a polymer may have had the undesirable consequence of making it more difficult to meet the particle release count standards of cleanrooms, because of the difficulty of removing contaminants from the wiper during the laundering process.

Based on the foregoing, it is clear that there was no motivation or suggestion to select the "wipe" of Yahiaoui et al. for use as a cleanroom wiper. Additionally, the skilled person would have a reasonable expectation of success in employing the coated substrate of Yahiaoui et al., in view of the evidence of the coating being partially removed by contact with an aqueous liquid.

Long Felt Need in the Art

Without question, there has been a long felt need for a cleanroom wiper, which not only has a very low particle release count, but improved contaminant pick-up. Applicants have submitted the following references for the Examiner's consideration and entry into the record: *Evaluating cleanroom wipers to establish performance benchmarks*, Micro, pp. 51-56 (May 1998); and *Full-Fab Surface Particle Detection Improves Yields*, Semiconductor International (June 1997).

The *Evaluating cleanroom wipers* article is a benchmark study of the performance of cleanroom wipers in the microelectronics industry. The objective was to ascertain the best performance currently achievable. The first characteristic tested is "Releasable particles" i.e. the number of particles released per square meter of wiper fabric. Micro at p. 51.

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The *Full-Fab Surface Particle Detection* article discusses the criticality of removing particulate contamination from the working surfaces and equipment used in semiconductor manufacture. The authors state that "particle contamination remains a serious threat to process yield." The primary method of removing particulate contaminants is with wipers. Please note the description of wiping techniques under the section entitled "Benefits of surface monitoring."

Applicants' claimed textile fabric satisfies the aforementioned long felt needs, by providing a cleanroom wiper having dramatically improved particulate adsorption characteristics, while meeting the stringent particle release requirements. It is axiomatic that the fewer particulate contaminants in the cleanroom, the less off-quality production due to such contamination.

Unexpected Advantages

It is well established that the unexpected advantages of an invention can rebut a *prima facie* case of obviousness. *In re Chupp*, 2 USPQ2d 1437 (CAFC 1987). A significant unexpected advantage of the present invention is the particle attraction properties of the coating, especially in the critical particle size of about 3 μm . In particular, the present invention demonstrates an improvement in adsorption of typical particulate contaminants of 50% or greater, or even 100% or greater, relative to an uncoated cleanroom wiper.

The examiner has taken the position that Yahiaoui et al.'s fabric has the same ability to attract particles. Therefore, the advantages are not unexpected.

The particle attracting advantage of the claimed coating was unknown, however, in the prior art. "Obviousness cannot be predicated on what is not known at the time an invention is made, even if the inherency of a certain feature is later established." MPEP § 2141.02, citing *In re Rijckaiet*, 28 USPQ2d 1955 (CAFC 1993).

Thus, from the viewpoint of the skilled person, there is nothing in the prior art to suggest the advantages that might be achieved by employing certain polymer coatings, relative to the adsorption of fine particulate contaminants in cleanrooms. The advantages achieved in the present invention are both unexpected and significant.

Examiner's Rationale

Claims 21-33 [sic] were rejected under 35 USC § 103(a) as being unpatentable over Yahiaoui et al. in view of Zeidell, and Applicants admitted prior art (AAPA). The examiner refers to the basis of the rejection as being "previously set forth." Applicants are not aware of the listed references being cited against Claims 21-33.

The Applicants note, however, that Claims 6, 12 and 31 were rejected under 35 USC § 103 as being unpatentable over Yahiaoui et al. in view of Applicants' Admitted Prior Art (AAPA), in

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The examiner found that Yahiaoui et al. disclose all elements of Applicants' Claims 1, 11 and 24, to which Claims 6, 12 and 31 depend. Yahiaoui et al. fails to disclose the fabric is saturated with a solvent and packaged in a sealed container.

AAPA teaches providing additional solvents and packages for pre-saturated wipers. Thus, it would have been obvious to utilize such packaging based on the reasonable expectation of providing pre-saturated wipers, such as are commercially available.

Rebuttal

The examiner correctly noted that Claims 6, 12 and 31 depend on independent Claims 1, 11 and 24, respectively. Applicants maintain that Claims 1, 11 and 24 are patentable, for the reasons set forth above.

Conclusion

Applicants respectfully submit that the grounds for rejection have been overcome, and the application is in condition for allowance.

Respectfully submitted,



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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to mail Stop Appeal Brief-Patents, Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1540 on October 3, 2003, along with a Request for Extension of Time, Transmittal of Appeal Brief and Authorization to Charge Deposit Account and a postcard receipt.



Timothy J. Monahan, Attorney for Applicant(s)

Appendix 1

1. (Amended) An article comprising a textile fabric selected from the group consisting of woven, knitted, wet laid, dry laid and needle punched fabric, and a particle attracting polymer coated on the fabric, the article having a particle attraction coefficient of 50% or greater for one or more of the types of particles selected from the group consisting of carbon black, copper, copper oxide, silicon, silicon oxide, tungsten and tungsten oxide particles, and a particle release count of particles greater than 0.5 microns of 75 million particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-CC004.2.

2. (Original) The article of Claim 1 having 0.01 to 6 weight % of polymer relative to the weight of the fabric.

3. (Amended) The article of Claim 1 wherein the fabric is woven or knitted from polyester fiber and has a weight of from 2 to 9 ounces per square yard.

4. (Original) The article of Claim 1 having a particle attraction coefficient of 100% or greater for carbon black.

5. (Amended) The article of Claim 1 wherein the polymer has a number average molecular weight of 25,000 to 1,000,000 and the polymer has a plurality of pendent groups selected from the group consisting of hydroxy, hydroxyalkyl and carboxy groups.

6. (Original) The article of Claim 1 wherein the article is saturated with a solvent and packaged in a sealed container.

7. (Amended) The article of Claim 1 having a particle release count of particles greater than 0.5 microns of 30 million particles per square meter or less as measured by

Biaxial Shake Test IEST-RP-CP-CC004.2 and an extrinsic sorbency of 3.5 milliliters/meter squared or greater as measured by IEST-RP-CC004.2.

8. (Amended) An article comprising a textile fabric and a particle attracting, water-soluble polymer coated on the fabric, wherein the polymer is selected from the group consisting of:

(i) polysaccharides having a plurality of pendent groups selected from hydroxy, hydroxyalkyl and carboxy groups; and

(ii) polymers formed by vinyl polymerization, having a plurality of pendent groups selected from hydroxy, hydroxyalkyl, carboxy, amino and alkylamino groups;

wherein the article has a particle attraction coefficient of 50% or greater for carbon black, and a particle release count of particles greater than 0.5 microns of 75 million particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-CC004.2.

9. (Amended) The article of Claim 8 wherein the polymer has an average molecular weight of 50,000 to 500,000

10. (Amended) The article of Claim 9 having 0.02 to 3 weight % of polymer relative to the weight of the fabric, and the fabric has a weight of 2 to 9 ounces per square yard.

11. (Original) The article of Claim 9 wherein the polymer is selected from the group consisting of cellulose ethers, poly(vinyl alcohol) and vinyl alcohol copolymers.

12. (Original) The article of Claim 11 wherein the article is saturated with a solvent and packaged in a sealed container.

13. (Amended) The article of Claim 11 having a particle attraction coefficient of 100% or greater for carbon black and a particle release count of particles greater than 5 microns of 300,000 particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-CC004.2.

14. (Amended) A wiper comprising a woven or knitted textile fabric and a particle attracting polymer coated on the fabric, wherein the polymer is selected from the group consisting of (i) cellulose ethers; (ii) inorganic cellulose esters; (iii) chitosan; (iv) guar gums and hydroxy, hydroxyalkyl and carboxy substituted derivatives thereof; (v) starch and hydroxy, hydroxyalkyl and carboxy substituted derivatives thereof; (vi) poly(vinyl alcohol) and vinyl alcohol copolymers; (vii) poly(vinyl pyrrolidone); (viii) poly(hydroxyalkyl acrylate) and poly(hydroxyalkyl methacrylate) and (ix) poly(alkyl acrylamide) and poly(alkyl acrylamide) copolymers;

wherein the article has a particle release count of particles greater than 0.5 microns of 75 million particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-CC004.2.

15. (Original) The wiper of Claim 14 having 0.05 to 1 weight % of polymer relative to the weight of the fabric.

16. (Original) The wiper of Claim 14 having a particle attraction ratio of 100% or greater for carbon black.

17. (Amended) The wiper of Claim 16 wherein the fabric constructed from polyester yarn having a denier of 15 to 250 and the fabric has a weight of from 2 to 9 ounces per square yard.

18. (Amended) The wiper of Claim 14 the polymer is selected from the group consisting of cellulose ethers, poly(vinyl alcohol) and vinyl alcohol copolymers having a number average molecular weight of 50,000 to 500,000.

19. (Original) The wiper of Claim 18 having from 0.02 to 3 weight % of polymer relative to the weight of the fabric and a particle attraction ratio of 50% or greater for carbon black.

20. (Amended) The wiper of Claim 19 having a particle release count of particles greater than 5 microns of 30 million particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-CC004.2 and an extrinsic sorbency of 3.5 milliliters/meter squared or greater as measured by IEST-RP-CC004.2.

21. (Original) The wiper of Claim 14 wherein the article further comprises a surfactant residue in the range of 0.1 ppm to 0.5 wt.%.

22. (Original) The article of Claim 1 wherein the article further comprises a surfactant residue selected from the group consisting of anionic and nonionic surfactants, in the range of 0.5 ppm to 0.1 wt.%.

23. (Original) The article of Claim 8, wherein the article further comprises a surfactant residue in the range of 0.1 ppm to 0.5 wt.%.

24. (Amended) An article comprising a textile fabric and a particle attracting polymer coated on the fabric, the article having a particle attraction coefficient of 50% or greater for one or more of the types of particles selected from the group consisting of carbon black, copper, copper oxide, silicon, silicon oxide, tungsten and tungsten oxide particles, and a particle release count of particles greater than 5 microns of 300,000 particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-

CC004.2, and the article is packaged in a sealed container and has not been laundered subsequent to the particle attracting polymer having been coated on the fabric.

25. (Original) The article of Claim 24 having a particle attraction coefficient of 100% or greater for carbon black.

26. (Amended) The article of Claim 24 wherein the polymer has a number average molecular weight of 25,000 to 1,000,000 and the polymer has a plurality of pendent groups selected from the group consisting of hydroxy, hydroxyalkyl and carboxy groups, and the fabric has a weight of 2 to 9 ounces per square yard.

27. (Amended) The article of Claim 24 wherein the article has a particle release count of particles greater than 5 microns of 300,000 particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-CC004.2.

28. (Amended) The article of Claim 27 wherein the particle attracting polymer is water-soluble and is selected from the group consisting of:

(i) polysaccharides having a plurality of pendent groups selected from hydroxy, hydroxyalkyl and carboxy groups; and

(ii) polymers formed by vinyl polymerization, having a plurality of pendent groups selected from hydroxy, hydroxyalkyl, carboxy, amino and alkylamino groups.

29. (Amended) The article of Claim 24 wherein the article has a particle release count of particles greater than 5 microns of 150,000 particles per square meter or less as measured by Biaxial Shake Test IEST-RP-CP-CC004.2.

30. (Original) The article of Claim 29 wherein the particle attracting polymer is selected from the group consisting of (i) cellulose ethers; (ii) inorganic cellulose esters; (iii) chitosan; (iv) guar gums and hydroxy, hydroxyalkyl and carboxy substituted derivatives thereof; (v) starch and hydroxy, hydroxyalkyl and carboxy substituted derivatives thereof; (vi) poly(vinyl alcohol) and vinyl alcohol copolymers; (vii) poly(vinyl pyrrolidone); (viii) poly(hydroxyalkyl acrylate) and poly(hydroxyalkyl methacrylate) and (ix) poly(alkyl acrylamide) and poly(alkyl acrylamide) copolymers.

31. (Original) The article of Claim 24 wherein the article is saturated with a solvent and packaged in a sealed container.